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COMPLIMENTS OF
THE AUTHOR.

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ITS BEARINGS UPON THE DURA-
TION OF HUMAN LIFE.

BY

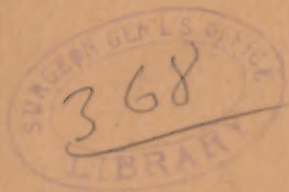
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Post-Graduate Medical School
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ITS BEARINGS UPON THE DURATION OF HUMAN LIFE.

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To counteract the *underlying factors of disease* is even more important than to combat disease when actually developed.

Life is, at best, precarious. "Three score years and ten" is reached but by a few. From infancy we are exposed to conditions which either predispose toward or actually excite disease. The basis and aim of all life insurance examinations is to determine, as far as human skill can, the existence or non-existence of two factors which necessarily modify the risk to life. These are as follows :

(1.) *Whether the applicant by heredity, climatic surroundings, occupation, personal habits and other causes, is not more than ordinarily liable to the development of disease.*

(2.) *Whether any evidence of existing weakness or of actual disease can be discovered by a physical examination.*

As examples of the former of these two factors, let me cite a few familiar illustrations which not infrequently present themselves. An applicant, for instance, who shows an unmistakable family tendency to consumption, and whose ancestors have seldom passed the age of forty-five years, would not at the age of thirty (even if in perfect health) be considered as good a risk as if his ancestry had shown no evidences of a phthisical tendency, and had been long-lived.

Again, one who from necessity was a resident of a malarial region, or where periodical epidemics of fevers were common, would be materially affected as a risk by that fact, in spite of good health.

Hazardous occupations increase the risk to life. A confirmed habit of excessive indulgence in alcohol does the same. A victim to the use of drugs, such as the morphine, chloral, or cocaine habits (which slowly tend to sap the nervous vitality of the patient, and to render him, as a consequence, more than ordinarily susceptible to atmospheric germs and disease) would be rejected by any careful medical examiner.

It is well and justly recognized to-day by the community at large, that it is necessary, for the protection of the interests of the insured, as well as that of the insurer, that every step be taken to ascertain, and every safeguard be used to overcome, through the medical examiners upon whose judgment the risk is to be accepted or rejected, all *predisposing factors* to the development of disease in any applicant for insurance.

The protection of the widow and the fatherless rests upon the faith of the community, at the present day, in the competency of the medical men, who, by their skill and discriminating judgment, keep the death-rate from assuming proportions that would prove

hazardous to the financial prosperity of the Corporations that have diversified financial interests, involving millions, in their keeping.

It is eminently proper, therefore, that the large corps of medical men who are employed by these Corporations, as well as the officers of these Corporations themselves, should, above all others, receive without prejudice and investigate most carefully all the advances of medical science which bear upon the *causation of disease*, as well as upon its relief. It is an imperative duty to themselves, to the Corporation that employs them, and to the community whose interests they serve.

I desire therefore that the thoughtful reader of these pages shall see in them no affectation of science or pretence to superior knowledge, but an honest and earnest purpose to bring to their notice, in a manner that is simple and practical, a statement of clinical facts, that are to-day receiving no small amount of attention from scientific medical men, and a theory that is based upon Nature and common sense.

In endeavoring to present the view (now quite generally accepted) that the eyes themselves may (when defective in refraction, or when imperfectly adjusted so that they fail to work in harmony with each other,) constitute an *important and too commonly neglected factor*, both in *causing and perpetuating disease*, I believe and trust that I shall open to the minds of some of my readers a field worthy of serious thought and careful consideration.

Many of the points touched upon in this article have been more fully discussed by me elsewhere; especially in my late work entitled "Lectures on Nervous Dis-

eases."* To this work and to many other sources† of information my readers are referred, in case their interest in the subject merits further inquiry on their part respecting it.

I deem it wise, moreover, in presenting this subject again to professional notice, in a somewhat new light, to incorporate in this article some extracts from my work on Nervous Diseases, wherever the illustrations employed seem to me to be particularly well adapted to the point at issue.

Within the past few years the attention of the medical profession has been drawn, more forcibly perhaps than ever before, to the fact that "eye-strain" may constitute an important element in the causation of all nervous disturbances of the so-called "functional" type, and also of many symptoms referable to the viscera. The latter are too often construed as indications of actual disease of the organ disturbed.

* F. A. Davis, Publisher, 1231 Filbert Street, Philadelphia.

† The reader is referred to the articles by Dr. George T. Stevens on "Chorea" ("Medical Record," 1876); on "Anomalies of the Ocular Muscles" ("Arch. of Ophthalmology," June, 1877); and on "Ocular Irritations and Nervous Diseases" ("New York Medical Journal," April, 1877); also to his work on "Functional Nervous Diseases" (D. Appleton & Co., N. Y., 1887); also to a contribution by Dr. H. D. Noyes, on "Tests for Muscular Asthenopia and Insufficiency of the External Recti," read by him before the International Medical Congress, Copenhagen, 1884; also to papers by the author on "The Eye as a Factor in the Causation of some Common Nervous Symptoms" (New York Medical Journal, February 27 and March 15, 1886); on "Eye-strain in Neurology" ("New York Medical Journal," April 16, 1887); on "Eye-strain in its relations to Functional Nervous Diseases" ("Medical Bulletin," September, 1887); and an abstract of an essay read before the International Medical Congress at Washington, entitled "Does a Relationship exist between Anomalies of the Visual Apparatus and the so-called 'Neuropathic Predisposition?'" ("Medical Register," November 19, 1887.)

In the light shed upon this subject chiefly by recent contributions to medical literature, the view is gradually being accepted by many in the profession that certain nervous diseases (whose pathology, to say the least, is still in doubt) are possibly not dependent in every case upon an unrecognized organic lesion : and they are being led to coincide with the statement that the term "functional" nervous disease may be properly applied, in some instances at least, to the graver nervous conditions—such, for example, as epilepsy, chorea, hysteria, or other manifestations of nervous exhaustion, and insanity.

In other words, the professional mind seems more willing now than in the past to discard an apparently fruitless search for a pathognomonic lesion for each intractable nervous condition, and to look more calmly upon tangible clinical facts, even if they are radically opposed to pre-existing views.

CAN NERVOUS DISEASES BE CAUSED BY "EYE-STRAIN?" The literature of medicine goes to prove conclusively that the duration of life is materially shortened by nervous debility and the diseases which it entails. Any factor therefore in their causation ought not to be overlooked. This subject of inquiry becomes invested with an importance which cannot well be ignored by searchers after truth.

If the view that "*eye-strain*" is a frequent cause of *functional nervous derangements* proves to be the correct one, beyond the possibility of doubt or cavil, it is not difficult to see that a hope of marked relief or of ultimate recovery is practically extended to many hopeless sufferers upon whom drugs have exerted little or no benefit.

In anticipation of the general acceptance of such a

view (which I feel assured must in time prevail), I have deemed it wise to discuss from a clinical and physiological standpoint some of the points involved in this theory.

In order that those of my readers who have possibly not given much attention to the views which these cases are particularly selected to illustrate may properly understand the train of reasoning that offered a solution to my mind of the symptoms here recorded, I take the liberty of quoting a few paragraphs from a paper which I lately read before the International Medical Congress at Washington, entitled "Does a Relationship exist between Anomalies of the Visual Apparatus and the so-called 'Neuropathic' Predisposition?"* This paper was based upon a carefully tabulated analysis of the records of one hundred consecutive cases of typical neuroses taken from my private case-book.

In this paper I say:

Until there is a uniformity in the methods employed for testing the eye-muscles,† and of terms for the recording of anomalies so detected, the profession must unfortunately continue to be more or less embarrassed in this line of research. I do not feel justified in personally discussing this subject here, as it has only an indirect relationship with this paper; but I cannot refrain from saying, in this connection, that to defective methods of examination, made venerable chiefly by their antiquity, we owe to-day, in my opinion, much of our ignorance of anomalies of the ocular muscles.

Some time ago I was struck, on looking over a children's magazine, with an illustration designed to teach the reader the dependence of the various organs of the body upon the brain. It represented the brain as the head of a manufacturing establishment sitting at his desk, and around him were the various departments—as, for example, the liver-department, the stomach-department, the eye-department, etc. These departments

* An abstract of this paper was published in the "Medical Register," November 19, 1887.

† See articles by Dr. Geo. T. Stevens, in the Archives of Ophthalmology, June, 1887.

were connected with the head of the establishment (the brain) by telegraph-wires, through which each could make its wants known and receive information regarding them.

Probably the designer of this sketch (made for the purpose of illustrating to the child the dependence of the organs upon the brain for their successful operation, as well as their actual support) built "better than he knew." He embodied in his drawing a graphic representation of certain fundamental principles of physiology which are not clearly understood even by many adult minds in their bearings upon the general health.

The lungs do not make us breathe, except in an indirect way, by asking the brain to start the necessary muscles into action. The stomach does not perform its functions until after the brain has been requested by it to turn on the blood-supply in sufficient quantities to produce the requisite quantity of gastric juice. The intestine performs its incessant worm-like movements by no inherent power of its own. The heart keeps up its rhythmical beating only when permitted to do so by the great center of nerve force.

Now, is it at all inconsistent with physiological principles to advance the view that *any excess of nervous expenditure to one organ over the normal amount which should be furnished is done at the expense of the others sooner or later?*

No one can draw incessantly upon his reserve capital of nerve-force without incurring a risk of ultimately exhausting it. A *bankruptcy in the reserve capital of nerve-force* entails untold ills to the individual.

The day of reckoning is postponed in any given case in direct proportion to the drafts made upon the reserve and the amount of the reserve. This may help us to explain why some escape it indefinitely, while others are precipitated into indescribable distress when life is hardly begun.

In case the bearing of eye-strain upon the problem of nervous expenditure is not very clear to some of my hearers, I deem it wise to quote here some extracts from my work already referred to, relating to the

more common ocular defects that are capable of transmission from parents to their offspring :

Although something has been written within the past few years in relation to the deleterious effects of errors of refraction and accommodation of vision and the condition known as "muscular insufficiency" upon the functions of the *nervous system and the viscera*, the profession at large is not yet thoroughly awakened to the importance of the detection and correction of such errors.

Most of you know that some persons can be made dizzy by looking from a height or inspecting a water-fall ; you have doubtless seen laymen suffer pains in the head and be made "sick at the stomach" by trying on a pair of spectacles which gave relief to a friend. You doubtless know that a "squint" in the eye is very often due to some defect in the refraction of the eye or a weakness of its muscles ; but possibly some of you do not know that a squint will occasionally disappear at once when the proper glasses are given to such a patient, without recourse to cutting the muscle. Perhaps it has never occurred to most of you that sight is the *only special sense which we use constantly* except during the hours of sleep. There is not a moment of the day or evening when we are not acquiring visual impressions of some kind.

Fortunately for our nervous system, the normal eye takes pictures of surrounding objects *without any muscular effort* when the object is more than twenty feet away ; hence, during the larger part of each day, the *normal eye is passive*, and is practically at rest, although performing its functions.

How different is the condition of the far sighted or "hyperopic" eye, however, from the normal ! For this eye (since it is *too short* in its antero-posterior axis) all objects *have to be focused by muscular effort*, irrespective of their distance from the eye. Such an eye is never passive. It has no rest while the body is awake. It is always straining more or less intensely to bring properly upon the retina the images of objects seen.

THE FLATTENED EYE.—The "hyperopic" condition of the eye, or "far-sightedness," as it is called, is a very common defect. It is especially frequent in persons of tubercular parentage.* It is well, therefore, to suspect the existence of this defect in children or adults whose ancestors have died of "consumption."

Hyperopia can not be corrected too early in life. It is unquestionably

* This is probably due to the shallowness of the orbits.

one of the *most frequent causes of "sick-headache,"* which, as we all know, runs in families. It is commonly encountered also (among other optical defects) in subjects afflicted with chorea and epilepsy. It is a congenital defect, and will never be "outgrown," as many people think. A hyperopic child, from the days of babyhood, suffers (unconscious perhaps of the fact) from a variety of symptoms which indicate the "strain" to which it is subjected in consequence of its efforts to see distinctly. Its eyes are liable to become easily suffused when it plays or looks steadily at near objects. A slight cast in the eye is sometimes developed. It occasionally "sees double" after it learns to read. It usually prefers and excels in out-of-door sports, which require only slight efforts at accommodation of vision. It finds that study and close application to books bring an indescribable sense of weariness and discomfort; hence, study becomes irksome and play brings a sense of peculiar relief.

Now, one peculiar fact should be noted here—*viz.*, that *hyperopic subjects often have remarkable weakness of style.* They are very apt (when young adults) to boast of their power of vision. They can often read all the test-types made for distance (twenty feet or more) without an error. If the defect exists in a child, the parents will frequently tell you how the child can see things with distinctness which possibly they themselves can not see at all; how they have tested its eyes from time to time; how absurd the idea seems to them and their friends that the vision of the child is defective; and how unnecessary the use of glasses seems to them (even if the eye is abnormal) so long as the child can get along without them. In some cases no amount of explanation or pleading will persuade the parents to have the ophthalmoscope or streak line used upon the child's eyes in order to decide the question of the existence of "latent" far-sightedness.

Some years ago I pleaded with a medical man to allow some oculist of reputation to examine his children's eyes, all of whom had weekly attacks of sick headache, inherited from both the mother and father, and in whom a tubercular tendency was strongly marked. I was refused, and the statement was made that never, while the father lived, should a child of his wear glasses with his consent. One of these children wears to-day a convex glass with a twelve-inch focus for distance; another wears the same glass with five

degrees of prisms added. These only partially correct an insufficiency of the muscles which exists in addition to the hyperopia. A third child is highly hyperopic and astigmatic. In every one of these subjects immense relief has been afforded by the correction of an optical defect which had rendered their early life one of suffering. This is not an uncommon experience. I could cite many more, if I deemed it necessary to prove what is already accepted by ophthalmologists as proved—viz., that hyperopia and eye-defect of other forms may prove to be *fruitful sources of headache*.

There is a prejudice among laymen and some medical men that glasses are an injury when they can be avoided; because, as they say, "a person becomes so dependent upon them when he once puts them on." This argument should be exactly reversed, and construed as follows: "*Because nature becomes dependent upon a glass which gives relief and corrects an existing strain upon the eye, no time should be lost in affording this relief.*"

Should a hip-splint be avoided (when the pain in the joint is arrested by it) because the patient feels his dependence upon the splint? Should a child be allowed to go through life with a deformed eye simply because the defect is not apparent to himself or his friends on account of an unnaturally developed ciliary muscle, which for a time renders the eye capable of getting along tolerably well in spite of its deformity?

In a late brochure of mine, speaking of intractable headache and its causes, I say:

More harm is being done to-day to the community at large by this fallacious argument than it is possible to compute. Thousands of sufferers from sick-headache and neuralgia are to-day struggling along through life with an optical defect uncorrected, and, in many instances, after costly experimentation with drugs and doctors, are left in despair of cure.

I speak strongly upon this point because I believe that the gastric symptoms which accompany typical attacks of sick-headache are not to be explained (as they commonly are) on the ground that the "liver is inactive," or that "dyspepsia exists," or that "the gastric juice is weak," or that "the patient uses tobacco to excess," or that "he has been living too high." Every one who has suffered for years with these attacks knows that they often occur without explainable cause; that they are cured sometimes by eating, drinking, and smoking, and made worse at other times by similar indulgences or excesses; that every known remedy is apt, sooner or later, to prove inoperative, and that a sure specific for them is unknown among the drugs of our Pharmacopœia. These subjects also know that life is rendered almost unendurable by the attacks at times. They are tractable patients, and will try anything, live in any way specified, and bear any privation without a murmur, if it will insure a cure.

I believe, from a personal experience of my own of this kind (which it is unnecessary to relate here), and from some experience also in examining the eyes of this class of sufferers, that the symptoms of sick-headache are reflex in character to a large extent, and are due primarily in almost every case to some optical defect. We can easily demonstrate that disturbed brain action from "eye-strain" may produce in a healthy child and in some adults all of the symptoms of these attacks in a few minutes. Why is it irrational, therefore, to affirm that a brain (disturbed by the constant efforts made to use eyes which are abnormal in respect to the refraction, accommodation, or the equilibrium which should exist between its various muscles) may manifest its disturbed state by nausea, headache, vomiting, dizziness, constipation, and other evidences of imperfect performance of the functions of the viscera? Does not our central nervous system regulate and directly control those functions? Is it not as probable that the master when upset disturbs the servants under him, as to advance the argument that the

servants themselves are the all-important factors in causation?

A second defect of the eye, which is less liable to cause physical debility than the hyperopic eye (already described) now merits attention. From the same work of mine I quote a short extract relating to it:

THE ELONGATED EYE. -- When the eye is too long from before backward, the patient is said to be "myopic," or *near-sighted*. Distant objects are more or less indistinct to such an eye in proportion to the excessive length of the antero-posterior axis of the eye over the normal standard. No amount of muscular effort can overcome or improve this defect in vision; hence these individuals are not subjected to the muscular strain which far-sighted persons constantly and unconsciously exert in order to see at a distance. Again, the near-sighted eye can read or perform any of the functions required of it (when brought sufficiently close to the object) without any muscular effort of an unnatural character. In contrast, the far-sighted eye has to exert a still greater muscular effort to see near objects distinctly than when employed upon distant objects; hence the fatigue, the blurring of letters upon a printed page, the watering of the eyes, the pain in the eyes and head, and the many other ills previously described.

Near-sighted subjects are generally conscious of an eye-defect, because they can not see across a room with distinctness or recognize familiar faces on the street. They are apt to become very fond of occupations which bring the eye close to their work, because they have no difficulty in seeing the object. Near-sighted children are liable to be considered precocious beyond their years, because they prefer to read rather than to play out-of-doors. It is generally safe to conclude that a child is near-sighted when it avoids out-of-door amusements in order to gratify a taste for reading or in-door occupations.

Near-sightedness is less liable to induce nervous disturbances than far-sightedness, provided it is not accompanied by astigmatism or muscular insufficiency. Yet it should be remembered that myopic subjects are more frequently sent to the oculist for relief than hyperopic subjects are, because the defect in vision is very apparent to all in the former class, and is more often unsuspected than recognized in the latter.

Finally, it behooves us to consider astigmatism and certain anomalies of the muscular adjustment of the

eyes, so that harmonious action of the two often becomes materially disturbed, and, in some patients, completely overthrown. I quote again an illustration which I have personally used in prior contributions:

THE ASTIGMATIC EYE.—You may find, in the third place, when you have examined the eyes of patients or friends who suffer from headache, persistent neuralgic attacks, etc., that a condition of the eye known as “*astigmatism*” may be detected, co-existing with far or near-sightedness, or independent of these refractive errors. In such subjects the cornea or the lens of the eye has a *greater curvature in some meridians than in others*: hence the images of all objects seen are more or less distorted when they fall upon the retina. To this class of sufferers some letters in the tests employed will be distinct, while others will not. If a number of dots are made upon a blackboard or a sheet of paper, some will appear as ovals, with a hazy border, or as lines, while others will more closely resemble the normal appearance of the dots. Finally, if a card, with lines running from its center to its periphery (the “clock-face test”), is used, some of the lines will appear blacker than the rest, and more clearly defined. Now, there can be no comfort to such subjects in their visual efforts. They learn by practice and experience to properly interpret, after a while, the imperfect images of objects seen, and they are aided in so doing by the fact that the outlines of letters, etc., become clearer in some positions, as regards the eyes, than in others: but, in spite of all that may be said to the contrary, the strain of using imperfect eyes tells upon most astigmatic persons sooner or later, and tends to excite reflex nervous phenomena of various kinds. To properly correct astigmatism by glasses is often an extremely difficult matter. It requires experience, a thorough knowledge of optics, and a familiarity with the practical use of the ophthalmoscope. There are comparatively few physicians (outside of the specialists in ophthalmology) who are capable of managing a bad case of this kind with perfect success. You can, however, easily detect its existence in most cases. When you discover it I would advise you to intrust its correction to skillful hands.

THE ASTHENIC EYE.—Finally, it is very important that you determine (in each patient whose eyes are examined by you) the *condition of the muscles* of the eye. The term “asthenopia” is commonly applied to that condition of the visual apparatus which entails suffering in conse-

quence of a defective "equilibrium" * in the muscular power exerted upon that organ when a fixed position of the eye is maintained for any length of time. When a state of perfect equilibrium is impaired from a weakness in some muscle of the eye, the effects become manifested sooner or later by pain and great discomfort after the eyes are used for any length of time. I have seen patients who could not attend a place of amusement, or read or sew, for even a short time, without great distress from this cause. These patients may or may not have a refractive error. In some instances, no glass but *prismatic ones* will benefit them.

A high-couraged horse feels the will, as well as the support of his driver through the reins by means of the bit. Although his course and rate of speed are changed from time to time at the will of the driver, the reins are never slackened. The horse becomes acquainted with the desires of his master by a sense of increased or diminished tension upon the reins. He is guided to either side by a difference in the tension of the two, although the driver does not entirely relax his hold upon the opposing rein while he uses the guiding one, and the difference in tension may be very slight.

So it is with the normal eye. It is both controlled and supported while performing its movements within the orbit by the eye-muscles (which are its reins). The brain is the driver. At its command the eye revolves, or remains stationary at any desired point. The tension of muscles, opposed to any movement of the eye required, is so modified by the brain as to insure the requisite support to the eye-ball, and to steady it as it moves. Thus a perfect equipoise is constantly established between opposing forces, adjusted with the nicest care to meet the full requirements of the organ under all possible circumstances. The normal eye does not tremble or wobble when it moves or the attempt is made to hold it in any fixed attitude. It is a piece of machinery, perfect in all its parts, reliable in its movements, perfectly controlled by its master.

The eye with "muscular insufficiency" is like a horse with an inexperienced and incompetent driver; the proper tension upon the reins is

* Cohn shows that, in 299 eyes under atropine, no case of absolute emmetropia was detected. Hausen found but 26 emmetropic eyes in 1,610, and Dürri but 30 in 414. A Randall states, in his article on "The Refraction of the Human Eye, a Critical Study of the Examinations of the Refraction, especially among school-children" ("Am. Jour. of the Med. Sci.," July, 1885), that only $7\frac{36}{100}$ per cent. of 1,834 eyes of infants and school-children were found to be emmetropic.

not maintained at all times, as it should be ; there is no equilibrium between antagonistic muscles ; fixed attitudes are maintained with difficulty for any length of time ; the brain becomes more or less disturbed by its inability to properly control the eye movements, and exhausted by the continual strain imposed upon it by the efforts required to do so even imperfectly.

Asthenopic subjects are *very frequently encountered* in the practice of a neurologist. The oculist, perhaps, sees them still oftener, because they are generally conscious that something is wrong with their eyes. Still, there are exceptions to this rule. I have examined patients who showed, in response to appropriate tests, very high degrees of muscular "insufficiency," that came to me for the relief of symptoms which had never been referred by themselves or their physician to and possible eye-defect. I recall the case of an epileptic who was placed under my charge. His family assured me he had "wonderful eyes"; and they were surprised when I examined them with care. The results of this examination showed, however, that twenty-five degrees of external insufficiency existed (as measured by the vertical diplopia test), and that he was hyperopic and astigmatic to a marked degree.

Insufficiency of ocular muscles seems to me to be a *congenital defect* in most cases—possibly in all. It is encountered in very young subjects. It is not a paralysis or a true paresis. It seems to vary with the nervous condition of the patient. It is not uncommon to note wide variations in the same case, if examinations are made from time to time. Possibly this fact helps to explain why competent observers do not always estimate the degree of insufficiency in a given case alike, even when similar tests are employed and equal care is given to the case.

We have no way, as yet, of determining "latent insufficiency," as we do latent hyperopia by atropine. Should a patient show us an insufficiency counteracted by a prism of a certain angle to-day, it only proves that he has *at least* that amount, not that he has no more. This statement can, I think, be demonstrated. It is an important fact to remember, when the results of examinations of such patients made by oneself are at variance with the observations made by another.

ARE REFRACTIVE ERRORS ALWAYS TO BE DETECTED BY TEST-TYPE OR THE OPHTHALMOSCOPE?

This is a second inquiry that has a decided bearing upon longevity, and in case the preceding points are regarded as tenable.

We have now reached a point where we should discuss the *necessity for the administration of atropine* to the patient. I usually employ a solution of gr. iv of sulphate of atropia to an ounce of distilled water. This can be kept constantly in your office in a phial with a rubber-top dropper substituted in place of a cork. A drop or two in each eye will suffice in most subjects to dilate the pupil widely and to paralyze the power of accommodation of vision for near objects in about three hours. In occasional instances it becomes necessary to keep the patient under its influence for several days, but this is not the rule.

Respecting this point in the examination of the eye, I have already said in a previous publication :

It is well to caution the patient, after using this drug, that he may possibly suffer from the sunlight, and that colored glasses will relieve him of this annoyance. It is also best to tell him that his vision may become very blurred for distant objects in case he is far-sighted ; and that, in any case, he will be *unable to read or to write by the aid of vision without glasses* for several days. I have known hyperopic patients to become greatly alarmed at the rapid loss of vision which has followed the use of

atropine; all of which could easily have been avoided had they been prepared for it by timely words of explanation. It is always well to explain to far-sighted subjects the difference between "manifest" and "latent" hyperopia, and to make them intelligent as regards the effect of atropine upon the "focusing" muscle before you administer it. If they are forced by their business to use their eyes for near-work while under the influence of atropine, a pair of cheap glasses may be given them for temporary use while under its influence.

I can not impress too strongly upon you the necessity of using atropine upon a patient (if young) for diagnostic purposes when an error of refraction or of accommodation is suspected. Personally, *I do not regard an examination as complete without it.* It solves the question of the presence of "latent" hyperopia—a very common defect and a very serious one (from the standpoint of the neurologist) if allowed to go unrecognized. It reveals the existence of a previous ciliary spasm. It often arrests headache as if by a magic touch, and solves the nervous origin of many other similar symptoms.

Patients who boast of their acuteness of vision, and who apparently justify their statement by reading test-type at a distance without the aid of glasses, are often astonished and sometimes alarmed at the immediate loss of this power which is brought about by the use of atropine. This surprise is heightened when (by the use of proper lenses) their power of vision for distance is immediately restored, and they become conscious for the first time of the muscular effort which they have been compelled in the past to exert in order to see without them. I shall never forget, personally, the sensation which I experienced of "seeing without effort" when a latent hyperopia was discovered in my own eye, and corrected by glasses.

These experiences are well-known facts among oculists, but to the profession at large they often occasion as much of a surprise as to the patient.

I could point to case after case in my own experience where the cause of neuralgic attacks, excruciating headache, vomiting, extreme nervousness, and many other symptoms (not apparently connected with eye-defects), would have remained unrecognized if atropine had not been employed.

ARE THE QUESTIONS INVOLVED RESPECTING THE SO-CALLED "HEREDITARY PREDISPOSITIONS TO DISEASE," YET FULLY UNDERSTOOD AND PROPERLY INTERPRETED?

A point may now be raised concerning which some misapprehension seems to exist among medical men, (judging from remarks which I occasionally hear expressed). I refer to the relationship of actual squint to nervous disturbances, and constitutional conditions which are unquestionably associated with heredity.

No one can deny that people frequently live for long periods of time in houses impregnated with sewer-gas and in the most malarious regions without apparently suffering in consequence. Yet no intelligent man would attempt to prove to-day that sewer-gas poisoning and malarial infection were delusions simply because some people had escaped their influence.

Respecting this point I say, in a prior publication:

The argument has been advanced that, because some cross eyed people have escaped epilepsy, chorea, insanity, and functional neuroses of the milder types, it is erroneous to maintain that eye-strain has anything to do with these conditions. This is absurd upon its face. The hint might, perhaps be pertinently dropped in this connection that cross eyed people practically suffer but little from their muscular error, simply because they have *habitual double vision which no effort on their part can correct*. These subjects learn very quickly to practically discard one image (the one seen by the crossed-eye) and to use one eye only for ordinary vision. In other words, they never try to blend the images of the two eyes, except in certain attitudes of the head which result in a single visual image, without an effort on the part of the patient.

It is only in those cases where (in spite of a muscular error) the images of the two eyes can be blended by a great effort that the patient begins to experience the deleterious physical influences of abnormal muscular tension in the orbit.

In my late work on nervous diseases, I say :

“If we admit the proposition that eye defects, or anomalies of the ocular muscles, are liable to become causes of impaired nervous energy, (because they demand an excess of nervous expenditure), we are

forced to the conclusion that the earlier this source of physical depression is removed the better are the prospects of the person so relieved of escaping diseases which impaired nervous energy necessarily tends to hasten or develop. We are naturally led to question if the so-called 'neuropathic predisposition' is not dependent, (in a certain proportion of cases, to say the least), upon 'eye-strain.'

"We might possibly also be led to think that the so-called '*tubercular tendency*' (which is present, as far as my observation goes, in nearly 50 per cent. of all cases of marked functional nervous disease), might, in some cases, be modified, controlled, or perhaps arrested before its physical results become apparent by taking from the life of such subjects a load which their small reserve capital of nervous energy particularly unfits them to endure.

"It is hard to give up the view, so universally conceded, that a predisposition to disease means a 'constitutional taint.' Yet, in many cases, we are absolutely unable to demonstrate that any evidence of physical weakness or disease has appeared until sufficient time had elapsed from the date of birth for the development of a serious impairment of nervous energy. What has caused it? Has it been deficient nourishment, a lack of maternal care or solicitude during childhood, gross violations of the rules of hygiene, or a lack of prudence on the part of the individual when of matured experience? The history of case after case answers 'no' to such surmises. These, then, are not the all important factors in every case. Phthisis, epilepsy, chorea, headaches, neuralgias, hysteria, dyspepsia, obstinate constipation, nervous prostration, inebriety, and many other evidences of the neurasthenic state are markedly

hereditary. What is the load (if any) which many sufferers of this type are carrying through life? *Have they a congenital burden*—which is, perhaps, too often unrecognized? I leave these questions for future research to solve.

“Did you ever see a tired horse fall prostrate under an excessive burden? *How long would he remain so were the burden not removed?*”

More people die of phthisis than of any other disease; hence anything that bears upon the tubercular predisposition is of the most vital interest to the community at large. While the possibility of this disease being directly transmitted (*per se*) by heredity has been called into question, and decided probably in the negative, there is, on the other hand, a general concurrence of medical opinion that a *predisposition to “consumption”* is inherited, and that the children of tubercular parents are peculiarly prone to be short-lived.

Again, the *predisposition to gout* is unquestionably transmitted by heredity. Yet, if we are asked to explain in what that predisposition lies, we are forced to avoid the point at issue by such platitudes as “that the processes of assimilation are weak and defective,” “that the formation of uric acid is excessive,” “that the liver fails to do its duty,” “that the kidneys are sluggish,” etc. We know, however, that sometimes the poor wretch in a hospital gets as frequent attacks of gout and often larger chalky deposits than does the rich wine-drinker; that medication often proves of little or no avail in restraining the disease; that attacks come on in spite of a most rigid diet and regular habits of life; that gouty symptoms do not appear (except in rare cases), before the age of twenty, and usually much

later in life ; and that a *condition of low nervous vitality* is almost always one which co-exists with the gouty diathesis.

Now, I have lately found in several cases of typical chronic gout, where chalky deposits have been very extensive, and a history of direct heredity could be traced through several generations, that an examination of the eyes has revealed a very high degree of "eye-strain." In my opinion, such a condition is not exceptional, but rather universal ; hence I am led to think that this factor is certainly one not to be despised or disregarded. If "eye-strain" exists, it can unquestionably cause a state of low nervous vitality ; it is constantly demanding an excessive expenditure of nerve force by the patient, who, with this particular diathesis, requires all the nerve-power at his command to aid the processes of digestion, assimilation and excretion ; it has been an active and oppressive handicap from the date of the patient's birth, and if unrelieved, will remain so until he dies ; it is a tangible hereditary defect that has doubtless passed, like certain characteristic features peculiar to the family, through some of the patient's ancestral lines ; finally, it has probably more to do with the inheritance of digestive ills late in life than any other one factor that has ever been observed in this type of patients.

It should constantly be borne in mind that no two cases exhibit identical manifestations of nervous depression or irritation. Some patients who are suffering from such conditions manifest the effects in physical, others in mental disturbances. The heart's action may be alone disturbed in some cases, the stomach may give out in others ; some may complain alone of spasmodic muscular troubles, some may notice its effects in the

eyes, some are rendered sleepless, many suffer from more or less persistent pains, a few complain alone of skin disturbances, and so on throughout the different parts of the entire human organism

We can understand how these apparently discordant facts may be reconciled when we recall the fact that by means of the brain and spinal marrow, and the nerves which unite these centres to the different parts of the body, we are enabled to see, hear, taste, smell, appreciate touch, swallow, breathe, and perform voluntary muscular acts. It is by means of our nerves alone that the heart beats; the digestive processes go on without our knowledge or control through the same agencies; the blood-vessels contract and dilate in accordance with the demands for blood telegraphed to the nerve-centre by different organs and tissues; and every process pertaining to life is thus automatically regulated. It requires no medical knowledge to see at once how a disturbance of so complicated an electric mechanism as the nerve-fibres and the nerve-cells of a living animal are can upset all or any one of the individual functions enumerated. Many of our houses are furnished to-day with electric bells by means of wires distributed in the walls. In some houses we light the gas-jets, and even the rooms themselves, by means of the same subtle fluid. When the battery becomes weak, or when the wires are disarranged or broken, what may be the results? Some of the bells may cease to ring when the button is touched, while others work properly. Perhaps the electric light may fail in some rooms and burn with its accustomed brilliancy in others. The gas-jets may not be properly ignited. So it is with the nervous apparatus of man. From the same cause one patient may have nervous dyspepsia,

another sleeplessness, a third headache or neuralgia, a fourth weakness of the muscles, a fifth disturbances of sensation, a sixth hysteria, chorea or epilepsy. It is needless to multiply illustrations.

The nervous system of man has been very aptly compared to a mountainous region where any atmospheric disturbance calls forth a "series of echoes" at distant points. So it is with many of the so-called "functional diseases." They may be simply the manifestations of a disturbance of the nervous system, entailed by causes which have been overlooked or imperfectly relieved.

Many diseases, which are to-day commonly regarded as of bacterial origin, owe their development, in my opinion, to some *underlying cause that has impaired the nervous functions*, and thus rendered the patient peculiarly susceptible to deleterious atmospheric influences. This view is held by many others beside myself. It is gaining ground among the profession in England and France, and lately Dr. Thomas J. Mays of Philadelphia has had the temerity to discuss in two public lectures, whether phthisis is not to be regarded as a pure neurosis.* Some points in his theory seem to me to be rather untenable; but many of his observations respecting the clinical association of the tuberculous predisposition with various marked neuroses are unquestionably accurate and in accord with well-accepted facts.

I have personally given this subject considerable attention, because in my maternal ancestry phthisis has been extremely frequent, and the duration of life materially lessened thereby. I am also confident that a correction of a high degree of latent hypermetropia (whose existence was unsuspected until atropine was instilled into my eyes) marked a turning point in my

*Therapeutic Gazette, Nov. and Dec., 1888.

own physical state which has never ceased to be a cause for gratitude.

For many years I have carefully investigated the ocular conditions of every patient who had cause to fear, as I had done in the past, the dreaded advent of pulmonary consolidation and softening. I have never yet encountered a case of typical phthisis, in which "eye-strain" did not exist as a factor (more or less potent, in my opinion, in causing and hastening its development). I believe most firmly that had this factor been recognized early in life, before the eyes were employed in study and other occupations, and if all anomalies of refraction and muscular equilibrium had been thoroughly rectified at that time, many of the hopeless sufferers from phthisis that we all have met, would have escaped the disease, not because certain atmospheric germs would not still have constantly assailed them, but because the vigor of their constitutions would not have been so sadly impaired by a constant and useless expenditure of nerve-force as to unfit them to combat disease.

The time is surely destined to come when legislation, (influenced by public opinion), will step in to protect the young from the serious physical effects of "eye-strain." Sooner or later, we will see nearly every child subjected to an eye-examination before admittance is sought for and obtained to our higher grades of instruction. Not a mere perfunctory set of tests, but a thorough search for existing defects based upon scientific methods and made by physicians skilled in that line of work.

In this millenium, a myopic child will no longer be placed in the row furthest from the black-board, and be held responsible for the stupid mistakes caused

by his inability to see. No longer will the excessively "hyperopic" child struggle along with headaches, blurring of the type on the page, mental confusion and distress after a prolonged use of the eyes, and the thousand other ills it is compelled now to endure from the ignorance of its parents or medical adviser. No longer will "esophoria," "exophoria" and "hyperphoria" * be unrecognized or deemed as of trivial importance; nor will an actual "squint," (of far less clinical importance, although a deformity), be magnified into undue importance.

Life-insurance examiners will then deem it necessary to take into consideration the possible existence of these hidden factors of disease, before they pass final judgment; physicians will, in time, rely less on drugs as specifics, and study symptoms more intelligently from the physiological standpoint.

A very pertinent remark was lately made by one of our most polished orators, when he said "Many people go through this world like those who ride backward in a railroad train. They never see anything until they have passed by it." So it is with many in our profession. Great advances are always made in spite of bitter opposition, groundless prejudice and wilful misconstruction. Those who stood highest in professional esteem at the time incited the populace to rage when Jenner first advocated vaccination. Harvey was despised because he advocated the circulation of the blood. McDowell was condemned to professional ostracism when he first practiced ovariectomy, yet to-

* The reader is referred to my work, "Lectures on Nervous Disease," for an explanation of these terms, or to the original article of Dr. George E. Stevens relating to them, in the *A. E. Med. Journal*, Dec. 4th, 1886.

day a costly monument, erected by the medical profession, marks his resting place.

In closing I would aim to make the following deductions clear to the reader:

1st. "Eye-strain" arises chiefly from defects in the refraction of the eye and an imperfect equilibrium in the muscles which move the eyes.

2nd. These conditions, when present, tend to cause an excessive expenditure of nerve-force by the individual in direct proportion to the amount of defect to be overcome.

3d. Excessive expenditure of nerve-force upon any one organ is commonly made at the expense of some other organ; or, if not, is paid out of the "reserve" of nerve capital possessed by the individual.

4th. The extent of the drafts thus made upon the "reserve" capital and the amount of "reserve capital" are the two factors which can alone determine, in any individual case, how long this state of things can last without causing a "nervous bankruptcy."

5th. The conditions mentioned as those which chiefly tend to cause "eye-strain" are transmitted from parent to child; hence they become operative at birth and last until death, unless mechanically or otherwise relieved.

6th. They are capable of detection and accurate measurement during life by scientific procedures. Some of the methods employed by oculists in testing the eye-muscles are not worthy of perpetuation.

7th. A condition of exhausted nervous vitality is sure to impair the general health in many ways, and to render the individual man more liable to disease than when in full vigor.

8th. Many of the constitutional diseases which ulti-

mately imperil the lives of their victims, are indirectly the result of a state of low nervous vitality (a state which is frequently the result of "eye-strain," from well-understood causes that might have been easily recognized and relieved).

9th. The so-called "inherited predisposition" to certain diseases is unquestionably based, in many cases, upon some anomaly of the visual apparatus. I am so well convinced of this fact that I assert it without fear of contradiction, from carefully gathered statistics.

10th. The examination of the eye for errors of refraction and accommodation, and a thorough familiarity with the tests lately advocated for the detection of anomalies of the ocular muscles,* ought not to be confined exclusively to the practice of the oculist.

They are as valuable to the general practitioner as are the physical signs of the chest.

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* *N. Y. Med. Journal*, Dec. 4th, 1886.

